

REMARKS

Applicant's counsel thanks the Examiner for the careful consideration given the application. Applicant requests an advisory action to the outstanding Official Action dated May 8, 2006.

Rejection under 35 U.S.C. 102(b) or 35 U.S.C. 103 (a) in view of Lee et al.

The Examiner has objected to claims 1-3 and 6-23 under 35 U.S.C 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103 (a) as obvious over Lee et al., US Patent 5516952.

Applicant disagrees and traverses the rejections for the reasons set forth below.

In response to the previous Official Action, the claims were amended to indicate that air is purged from the reactor. In the present Official Action, the Examiner advises that Applicant's arguments were not found persuasive. Although the Examiner concedes that Lee does not refer to purging of air in his description, it is the Examiner's contention that the water employed in the patented process of Lee is of such a temperature that when heated, the steam generated would inherently purge the air in the reactor. This is incorrect.

The process described by Lee pertains to oxidative decoupling of rubber polymer materials (underlining added for emphasis). In this process, an oxidant is added to the reactor to decouple carbon-carbon, carbon-sulfur and sulfur-sulfur bonds in the rubber. According to Lee:

"The oxidant or oxidizing agent is preferably air, oxygen or a mixture of oxygen and inert gases, but other oxidants...can be used such as peroxy compounds or oxygen generating species... including any compounds known to generate or release oxygen at reaction conditions" (see column 5, lines 65 to column 6, line 6).

Accordingly, Lee teaches away from purging air from the reactor, as recited in Applicant's pending claims because air is an oxidant and oxidants are an essential component of the oxidative decoupling process described by Lee.

In the Official Action, the Examiner notes that Lee *"does not refer to purging of air in his description of the invention but that the water employed in the patented process is of such a temperature when it is heated that it would inherently generate steam in the reactor. This generating of steam would inherently purge the air in the reactor."* This is incorrect.

As evidenced throughout the Lee disclosure, and with particular reference to both Examples provided by Lee, a one gram sample of a scrap tire was charged to and oxidatively decoupled in a one-liter Hastelloy C-26 reactor (see column 10, lines 29, 31 and lines 61-63). The addition of water that is heated to steam does not purge the air from the reactor. The air remains trapped within the vessel to interact with the rubber polymer materials. According to Lee this is desirable because air is an oxidant that participates in the oxidative decoupling process.

In contrast to Lee, the disclosure and claims of the instant application recite the step of purging air from the reactor. As noted by the Examiner, page 8, second paragraph of Applicant's specification discloses:

"Prior to attaining the desired reaction temperature air present in the reactor is purged . In the current exemplary embodiment the air present in the reactor is purged with steam generated during the heating step. Other appropriate means for purging air from the reactor, include purging with an inert gas, will be apparent to those of skill in the art. Once the air has been purged the reactor is sealed from the external environment" (underlining added for emphasis).

It is submitted that the Examiner has inadvertently overlooked Applicant's disclosure relating to Examples 1-14 provided on page 10 of the specification:

"A reactor capable of operating at temperatures of up to 500°C and pressures of up to 5000psi was used in all experiments. The reactor was charged with between about 20 and 30 g of rubber and about 100 ml of water...Heating was initiated with a valve on the reactor remaining open. This valve was closed after the vessel had

reached a temperature greater than 100°C. This allowed for the purging of air from the reactor with steam generated during heating of the reactor...(underlining added for emphasis)

In the claims of the instant application, the heating of water to steam with the valve open displaces air from the reactor thereby reducing the propensity for oxidative decoupling reactions in the rubber reduction process. This is clearly different from Lee which requires and depends on an oxidative decoupling process.

It is also submitted that the oxidative decoupling process described by Lee results in the depolymerization of rubber into smaller components including oxygenated hydrocarbons (see for example, column 2, lines 14-21 and column 5 lines 1-3). This is a result of the oxidative decoupling process. Thus, the products generated by the oxidative decoupling process of Lee are different from those produced according to the method of the present invention.

In the Official Action, the Examiner alleges that it is not clear that any result of an unexpected nature is achieved by purging the air with steam. Applicant disagrees and traverses the Examiner's allegation. As described throughout the Lee patent, the reaction times are on the order of about one minute or less (see Examples 1 and 2, column 10, lines 39 and 65-66) and result in hydrocarbons and oxygenated hydrocarbons having 1 to 7 carbon atoms (see column 10, lines 51-52 and column 11 lines 7-10). Clearly, the Lee process results in devulcanization and depolymerization of rubber. In contrast, Applicant's disclosure and examples suggest that the reaction conditions can be selected to favor devulcanization over depolymerization. This represents an important advance in the field of rubber reduction technology. Further, Applicant's process does not require the use of harsh solvents or the addition of chemicals.

In summary, Lee does not teach or suggest purging air from the reactor as recited in the claims of the instant application. Further, as Lee requires the use of an oxidant which may be air, it is submitted that Lee teaches away from purging air from the reactor. Accordingly, claims 1-3 and 6-23 are novel under 35 U.S.C. 102(b) and unobvious under 35 U.S.C. 103 (a) in view of Lee et al., US Patent 5516952. Removal of the rejection is requested.

Rejection of claims 1-23 under 35 U.S.C. 103(a) in view of Lee et al., having regard to Hunt.

The Examiner has rejected claims 1-23 under 35 U.S.C. 103(a) as obvious over Lee as applied to claims 1-3 and 6-23 and further in view of Hunt et al., US Patent No. 5891926. Applicant disagrees and traverses the rejection using the previous remarks made above for Lee and also the following arguments.

Lee discloses an oxidative decoupling process requiring the use of an oxidant such as air. There is no teaching or suggestion in Lee that the oxidative decoupling process can proceed in the absence of an oxidant. Further, the requirement of Lee to use an oxidant such as air teaches away from the subject matter claimed in Applicant's application. A person of skill in the art would be led away from purging air in the reactor having regard to the teachings of Lee. As Lee teaches away from Applicant's subject matter, it is submitted that Lee in combination with Hunt does not render Applicant's claimed subject matter obvious.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

It is submitted that the Examiner has not considered the full teachings of both Lee et al and Hunt et al when making the outstanding obviousness rejection. Upon proper analysis of both references, it is submitted that a person of skill in the art would not be motivated to combine the teachings of Lee with Hunt to arrive at the subject matter claimed in the instant application. Applicant's reasoning is set forth below.

As described previously, Lee provides a process for oxidative decoupling of rubber polymer materials. The oxidant or oxidizing agent employed by Lee is preferably air,

oxygen or a mixture of oxygen and inert gases, but other oxidants such as peroxy compounds or oxygen generating species including any compounds known to generate or release oxygen at reaction conditions may be used (see column 5 lines 65-column 6 line 6). There is no teaching or suggestion in Lee that the oxidative decoupling process can proceed in the absence of an oxidizing agent.

Hunt discloses a process for the devulcanization of rubber. Hunt further discloses that *"it is important to protect the devulcanized rubber from oxygen during the process."* A person of skill would not be motivated to combine the teachings of Lee with those of Hunt as the two processes are incompatible. Hunt teaches away from the subject matter of Lee.

It is also submitted that Lee discloses the use of water as a solvent in the oxidative decoupling process. There is no teaching or suggestion that the process may be employed with other solvents or co-solvents. Hunt discloses the devulcanization of rubber in the presence of 2-butanol. There is no teaching or suggestion in Hunt that other solvents may be employed in the devulcanization process. As 2-butanol and water are two very different solvents with different chemical characteristics and reactivities, A person of skill in the art would not be led or motivated to combine the teachings of Hunt with those of Lee as the required solvent systems in each patent are distinct and there is no suggestion that alternate solvents may be used.

It is also submitted that Hunt is directed to the devulcanization of rubber, a process that breaks sulfur-sulfur bonds and/or carbon-sulfur bonds rather than carbon-carbon bonds (see column 2, lines 19-21). Thus, Hunt is directed to devulcanization rather than depolymerization of rubber. In contrast, the Lee patent is directed to oxidative decoupling of carbon-carbon, carbon-sulfur and sulfur bonds to produce low molecular weight products. Thus Lee is directed to depolymerization rather than the preferential devulcanization of rubber. As both patents are directed to different chemical processes, it is submitted that a person of skill in the art would not be led or motivated to combine the teachings of Lee with those of Hunt.

Based on the arguments used above, it is submitted that claims 1-23 are not obvious under 35 U.S.C. 103(a), in view of Lee et al., having regard to Hunt. Further, it is submitted that a person of skill in the art would not be led or motivated to combine the teachings of Lee with those of Hunt. Removal of the rejection to

claims 1-23 under 35 U.S.C. 103 (a) in view of Lee having regard to Hunt is requested.

If there are any further fees required by this communication, please charge such fees to our Deposit Account No. 16-0820, Order No. 36115.

Respectfully Submitted,

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